AAF-3

Programmable, 2- to 8-Channel Low-Pass Filter and Differential Amplifier Board for the PC/AT

- Compatible with popular A/D converter boards
- 2, 4, 6, or 8 low-pass or high-pass filter channels
- Software-programmable gains of 0.5 to 1000 per channel
- 8-pole elliptic, linear phase filters, optional Bessel, Butterworth, Cauer, or high-speed linear phase filters
- Software-selectable cutoff frequencies from 1 Hz to 200 kHz
- Up to 4 different cutoff frequencies on each board
- Optional high-pass and band-pass filters with maximum bandwidth of 200:1
- Graphical application software and driver libraries for Windows 98/95/NT/3.1, LabVIEW, HP VEE, and Dasylab
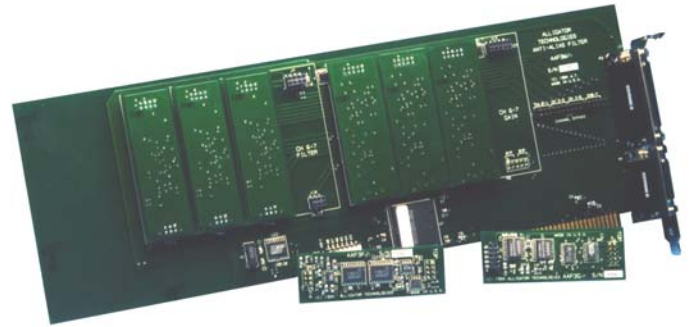

AAF-3 Filter/Amplifier Board

The AAF-3 series of PC plug-in boards provides 2 to 8 programmable channels of low-pass filtering and/or high-quality instrumentation amplifiers (with optional band-pass and high-pass filters) for front-end signal conditioning with all popular A/D converter boards.

Each channel is available with a wide choice of filter characteristics using the AAF-3F software selectable 8-pole elliptic and linear phase filters or the AAF-2F which is available as a Bessel, Butterworth, Cauer, high speed Cauer, linear phase, or high-speed linear phase filters. With a variety of filter types a high stop-band attenuation of 85 dB typical to as high as 90dB is available. When using the AAF-3G gain, a high common-mode rejection of 90 to 100 dB typical at high gains can be attained.

Using an AAF-2F filter without the AAF-3G amplifier increases the common-mode protection of the AAF-3 to ±40V.

High-quality instrumentation amplifiers on each channel provide software-selectable gain as well as differential inputs with high-common mode rejection. Channels are independently programmable for gain settings of 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500 or 1000.

The cutoff frequency of each 2-channel pair of filters can be set with an external clock or programmed for a range of frequencies from below 1Hz to 50kHz for the AAF-3F linear phase filter or from below 1Hz to 100kHz for the AAF-3F elliptic filter. The AAF-2F filter types provide cutoff frequencies between 0.1Hz and 200kHz. Please refer to the AAF-2F data sheet for more information. Four different control sources are available allowing for up to four separate cutoff frequencies on each AAF-3.

Support Software
The AAF-3 comes with the most complete collection of menu-driven programs and drivers available with any filter/amplifier card.

- **DLL drivers for Windows 95/98/NT, Windows 3.1 and DOS** with example application programs for popular compilers, including Visual Basic, Visual C++, and Borland C++.

- **SETAFF3 for DOS and SystemViewAAF for Windows 95/98/NT** is a graphical application that uses a few simple mouse clicks to program the board's filter type, cutoff frequency, and gain setting. Once selected, the desired parameters can be saved as an AAF-3 setup file that can be easily recalled and reapplied.

- **Support for LabVIEW, HP VEE, and Dasylab** *(16- and 32-bit)* is also supplied.

DC Offset. All filter modules for the AAF-3 feature automatic DC offset compensation and are highly suited in applications requiring minimal offset. The DC offset compensation may be optionally disabled and may exhibit higher values then specified.

Input Connection. The AAF-3G gain daughter board or the AAF-2F filter board provides differential input. If only an AAF-3F filter daughter board is used then the input is single ended.

AAF-3F Filter Module Specifications (Filter Type is Software-selectable)

	Cutoff Frequency	Passband Performance	Stopband Rejection	Total Wideband Noise	Phase Match
Elliptic	10 Hz - 100 kHz standard 1 Hz - 100 kHz optional	+0.4dB -0.2dB max, to 0.85 cutoff	90 dB Typ.	110μVRMS Typ.	-
Linear Phase	10 Hz - 100 kHz standard 1 Hz - 100 kHz optional	Group delay $\pm$0.5% max and -1dB droop max at 0.75 cutoff, low-freq gain +0.4dB -0.2dB max	90 dB Typ.	90μVRMS Typ.	-

AAF-2F Filter Module Specifications (Filter Type is not Software–selectable)

	Corner Frequency Range band is software selectable	Passband Performance	Stopband Rejection	Total Wideband Noise	Phase Match
Bessel	10 Hz – 33 kHz narrow 10 Hz – 67 kHz wide	Group delay $\pm$1% max to f_c, 2dB droop type at 0.75 f_c; low-freq gain –0.5dB +0.15dB max	84 dB Typ.	60μVRMS Typ.	1.2° Typ.
Butterworth	10 Hz – 50 kHz narrow 10 Hz – 100 kHz wide	+0.15dB to -0.5dB max, to 0.85 f_c	90 dB Typ.	80μV RMS Typ.	1.2° Typ.
Cauer	10 Hz – 50 kHz	$\pm$0.4dB max, to 0.85 f_c	75 dB Typ.	165μVRMS Typ.	2.5° Typ.
High-Speed Cauer	10 Hz – 50 kHz narrow 10 Hz - 100 kHz wide	Low-freq gain +0.1 dB – 0.5dB max; ripple 0.75dB max to 0.95 f_c	90 dB Typ.	135μVRMS Typ.	1.0° Typ.
Linear Phase	10 Hz – 50 kHz narrow 10 Hz – 100 kHz wide	+.65dB, -.6dB max; -2dB,-.35dB @ .75 f_c +5.75dB, -3.75dB @ f_c narrow band -4.5dB, -2.5dB @ f_c wide band	90 dB Typ.	115μVRMS Typ.	3.0° Typ.
High-Speed Linear Phase	10 Hz – 100 kHz narrow 10 Hz – 200 kHz wide	+.4dB, -.2dB max. 85dB at f_c output voltage swing $\pm$3V typ.	90 dB Typ.	175μVRMS Typ.	1.7° Typ.

AAF-HP Filter Specifications

	Corner Frequency	Passband Performance	Stopband Rejection	Total Wideband Noise	Phase Match
High-Pass/ Band-Pass	1 Hz to 10 kHz (pseudo elliptic)	0 $\pm$ 5 dB max to cutoff, low-freq gain 0 $\pm$ 0.25dB max, <1Ohm output impedance, 0mV offset	90 dB Typ.	135μVRMS Typ.	-

Analog Input (with Gain)

DC offset...............................Auto compensation (w/standard filters)
Amplifier gain accuracy.........$\pm$0.08 dB max
Common-mode rejection.......75 dB in, 86 dB typ (gain = 1)
Common-mode voltage.........$\pm$10 V max*
Input voltage (gain = 0.5)......$\pm$10 V max
Input protection.....................$\pm$50 V max
Input impedance ....2 MΩ each side to analog ground
Input bias current ....$\pm$2 pA type, $\pm$100 pA max
Input offset current...............$\pm$1 pA type, $\pm$100 pA max
Amplifier bandwidth...............Gain = 0.5 - 5, 1.2 MHz typ
                      Gain = 10 - 100, 600 kHz typ
                      Gain = 200 - 1000, 250 kHz typ
Amplifier slew rate.................9/gain V/μsec typ

Analog Output

Output voltage ....$\pm$5 V min
Load resistance.....................1KΩ min
Output impedance.................27 $\pm$ 3Ω

Miscellaneous

Power consumption ....10mA at +5V, 1A at +12V
Operating temperature..........0°C to 70°C

* $\pm$8V if differential input greater than 5V/gain (or greater than 5V at gain = 0.50).

System Accessories

The AAF-3, when used with any A/D board, provides for a more accurate data acquisition system. BNC boxes and screw terminal panels for AAF-3 input and direct-connect cables for output make for easy integration into any system.

AT-BNC-3/I	8 channel BNC input box with cable
AT-BNC-3/O	8 channel BNC output box with cable
STA-AAF-3	Screw Terminal adapter for I/O
CA31	input cable open ended
CA32	output cable open ended
CA33	output cable with mating connector to A/D
CA35	input cable with mating connector to source
CA39	output cable with mating connector to A/D and second connector for auxiliary A/D pins
CK-A3	AAF-3 mating connector kit

Refer to the Alligator Technologies Data Acquisition Price List or your distributor for details on how to specify and order cable accessories.